UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/088,217	07/17/2002	Helmut Weyl	10191/2343	1012

26646 7590 07/21/2005

KENYON & KENYON
ONE BROADWAY
NEW YORK, NY 10004

EXAMINER	
VESTAL, REBECCA MICHELLE	
ART UNIT	**PAPER NUMBER**
1753	

DATE MAILED: 07/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/088,217	WEYL ET AL.	
	Examiner	Art Unit	
	R. Michelle Vestal	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see page 3, lines 15-26, filed May 13, 2005, with respect to the rejection of claims 13, 17, 19, 21 and 23 under 35 USC 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made in view of U.S. Patent Number 5,782,227 to Abe.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 13, 17, 19, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 5,782,227 to Abe in view of U.S. Patent Number 5,246,562 to Weyl et al., referred to hereafter as "Weyl."

Regarding claim 13, Abe discloses an exhaust gas sensor (Fig. 1, **11**) configured to be installed in an exhaust gas line of an engine (Fig. 1, **107**) comprising:

a heating device (Fig. 1, **112**); and

a sensor element (Fig. 1, **111**) heatable to a first temperature to measure an exhaust gas, the sensor element including the heating device (Col. 3, lines 29-33); and

a heating power supply (Fig. 1, **121**) configured to supply in a first operating phase, a high power for rapid heating of a section of the sensor element exposed to the exhaust gas (Col. 6, lines 1-4 and Fig. 6C) to a second temperature sufficient to ignite a thermal afterburning of unburned constituents of the exhaust gas (see Fig. 6C, dashed lines) and to supply, in a subsequent second operating phase, a lower power to maintain the sensor element at the first temperature (Col. 6, lines 24-27 and Fig. 6C).

It is noted, that although Abe does not desire the heating power supply to be operated at the second temperature under normal operating conditions, the apparatus is capable of doing so, as demonstrated in figure 6C.

Abe does not disclose expressly that the exhaust gas sensor comprises a housing or that the sensor element is ceramic.

Weyl discloses an exhaust gas sensor (Fig. 1, **10**) comprising a housing (Fig. 1, **11**) configured to be installed in an exhaust gas line of an engine (Col. 2, lines 26-30) and a ceramic sensor element (Fig. 1, **38** and Col. 3, lines 47-53) mounted in the housing and heatable to measure an exhaust gas (Col. 5, lines 55-60), the ceramic sensor element including the heating device (Fig. 6, Col. 5, lines 50-54 and Col. 6, lines 24-27).

Abe and Weyl are analogous art because they are from the same field of endeavor, that is exhaust gas sensors for internal combustion engines.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have included a sensor housing and a ceramic sensor element of Weyl in the exhaust gas sensor of Abe because many exhaust gas sensors comprise a housing to contain the sensor element and circuitry and a ceramic sensor element in order to withstand the high temperatures the exhaust gases reach in an internal

combustion engine. Furthermore, the exhaust gas sensor of Weyl can be easily produced and assembled and prevents impairment of the gas measurement sensor on the connecting side to the greatest extent, as taught by Weyl (Col. 1, lines 34-46).

Therefore, it would have been obvious to combine Abe and Weyl to obtain the invention as specified in claim 13.

Abe discloses the limitations of claim 17, wherein the heating power supply is configured to deliver a pulsed heating current in the second operating phase, as determined by the calculated duty cycle of the heater (Col. 5, lines 44-49).

Abe discloses the limitations of claim 19, wherein the heating power supply is configured to monitor an internal resistance of the heating device (Fig. 2) and to change from the first operating phase to the second operating phase when the internal resistance exceeds a limit value (Col. 3, line 47-Col. 4, line 19).

Abe discloses the limitations of claim 21, wherein the heating power supply is configured to cyclically compare the internal resistance of the heating device and the limit value during the first operating phase (Fig. 2 and Col. 3, lines 40-42).

Abe discloses the limitations of claim 23, wherein the heating power supply is configured to change to the second operating phase after a predetermined maximum

period of time, regardless of the internal resistance monitored, by reducing the power supplied as time elapses after the engine has been started (Col. 6, lines 29-36 and Fig. 6B).

Claims 14, 15, 18, 20, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe and Weyl as applied to claim 13 above, and further in view of either U.S. Patent Number 6,083,369 to Tanigawa or U.S. Patent Number 5,544,640 to Thomas et al., referred to hereafter as "Thomas."

Regarding claims 14 and 24, Abe does not disclose expressly that the exhaust gas sensor comprises more than one heater or that the heating device is configured to reach the first temperature within a maximum heating time of five seconds.

Weyl discloses that the exhaust gas sensor often comprise more than one layered heating element, such as layered resistors of defined characteristics.

Weyl does not disclose expressly that one heating element is configured to maintain the sensor element at that first temperature, that a second heating element is configured to rapidly heat the sensor element to the second temperature or that the

heating device is configured to reach the first temperature within a maximum heating time of five seconds.

Tanigawa discloses an exhaust gas sensor, wherein the heating device includes two heating circuits (Fig. 2A, **8** and **9**), a first one of the heating circuits configured to maintain the first temperature (Col. 5, lines 8-15 and line 46-Col. 6, line 16) a second one of the heating circuits configured to rapidly heat to the second temperature (Col. 6, lines 25-29). Thomas also discloses an exhaust gas sensor, wherein the heating device includes two heating resistance elements (Fig. 2, **30** and **32**), a first one of the heating resistance elements configured to maintain the first temperature (Col. 3, lines 57-64) a second one of the heating resistance elements configured to rapidly heat to the second temperature (Col. 3, lines 52-55). Neither Tanigawa nor Thomas discloses expressly the amount of time required to heat the sensor element to the first temperature, although both explicitly disclose that the sensor is heated as rapidly as possible to the operating temperature, as noted above. Absent evidence to the contrary, one of ordinary skill in the art would consider "rapidly or quickly" heating to be a heating time of five seconds.

Abe, Weyl, Tanigawa and Thomas are analogous art because they are from the same field of endeavor, that is exhaust gas sensors for internal combustion engines.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have included the two heating circuits for maintaining the first temperature and rapidly heating to the second temperature of either Tanigawa or Thomas in the exhaust gas sensor of Abe or Weyl because the exhaust gas sensors have specific operating temperature ranges and may not detect proper amounts of exhaust gas prior to reaching this range given inherent sensor limitations, as taught by Thomas (Col. 1, lines 19-22) and by Tanigawa (Col. 2, lines 61-65). It would, therefore, be desirable to heat the sensor as quickly as possible so that the sensor is operable for detection as soon as possible.

Therefore, it would have been obvious to combine Abe, Weyl and Tanigawa or Thomas to obtain the inventions as specified in claims 14 and 24.

Regarding claim 15, Abe does not disclose expressly that the exhaust gas sensor comprises a shielding body to protect the sensor element.

Weyl discloses the limitations of claim 15, wherein the housing includes a shielding body (Fig. 1, **22**) configured to protect the ceramic sensor element from direct oncoming flow of the exhaust gas and the section of the sensor element heatable to the second temperature integrated into the shielding body (Col. 2, lines 47-53).

Abe and Weyl are analogous art because they are from the same field of endeavor, that is exhaust gas sensors for internal combustion engines.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have included the shielding body of Weyl in the exhaust gas sensor of Abe because the shielding body protects the measuring chamber and the gas measurement sensor from debris and direct oncoming flow of exhaust gas by directing flow of the gas to be measured through a number of inlet and outlet openings, as taught by Weyl (Col. 2, lines 47-53).

Therefore, it would have been obvious to combine Abe and Weyl to obtain the invention as specified in claim 15.

Regarding claims 18, 20 and 22 Abe discloses that the heating power supply is configured to monitor an internal resistance of the heater device and to change from the first operating phase to the second operating phase when the internal resistance exceeds a limit value (Col. 3, line 47-Col. 4, line 19), to cyclically compare the internal resistance and the limit value during the first operating phase (Fig. 2 and Col. 3, lines 40-42) and to change to the second operating phase after a predetermined maximum period of time, regardless of the internal resistance monitored, by reducing the power

supplied as time elapses after the engine has been started (Col. 6, lines 29-36 and Fig. 6B).

Abe does not disclose expressly that the heating power supply is configured to monitor the internal resistance of the sensor element.

Tanigawa discloses an exhaust gas sensor, wherein the heating power supply is configured to monitor an internal resistance of the sensor element and to change from the first operating phase to the second operating phase when the internal resistance exceeds a limit value (Col. 2, lines 35-43 and Col. 5, lines 8-22).

Abe, Weyl and Tanigawa are analogous art because they are from the same field of endeavor, that is exhaust gas sensors for internal combustion engines.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to configure the power supply to monitor the internal resistance of the sensor element of Tanigawa in the exhaust gas sensor of Abe because monitoring the resistance of the sensor element is one of many ways to control the temperature of the heater in an exhaust gas sensor, as taught by Tanigawa (Col. 2, lines 35-43).

Therefore, it would have been obvious to combine Abe, Weyl and Tanigawa to obtain the inventions as specified in claims 18, 20 and 22.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe, Weyl and either Tanigawa or Thomas as applied to claim 15 above, and further in view of European Patent Application Number EP 0747580, referred to hereafter as "EP '580."

Regarding claim 16, Abe discloses that the heater is arranged on the sensor element (Fig. 1, **111** and **112**).

Abe does not disclose expressly that the exhaust gas sensor comprises a shielding body with a heater arranged on the shielding body.

Weyl discloses an exhaust gas sensor comprising a shielding body (Fig. 1, **22**) to protect the sensor element and measuring chamber.

Weyl does not disclose expressly that a heater is arranged on the shielding body.

EP '580 discloses an exhaust gas sensor comprising a heating circuit arranged on the shielding body (Fig. 4a, **70**) to ignite afterburning (Col. 3, lines 30-35).

Abe, Weyl, Tanigawa, Thomas and EP '580 are analogous art because they are from the same field of endeavor, that is exhaust gas sensors for internal combustion engines.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include a heater on the shielding body of EP '580 in the exhaust gas sensor of Abe and Weyl because the heater on the shielding body can be used to heat sensor element to its operational temperature range, as taught by EP '580 (Col. 3, lines 33-35). The heated shielding body would also be able to heat the incoming exhaust gas to minimize detection errors resulting from cooling of the sensor element by exhaust gas at a lower temperature.

Therefore, it would have been obvious to combine Abe, Weyl, Tanigawa, Thomas and EP '580 to obtain the invention as specified in claim 16.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to R. Michelle Vestal whose telephone number is (571) 272-0524. The examiner can normally be reached on Monday-Friday, 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

rmv /rmv
July 15, 2005

KAJ K. OLSEN
PRIMARY EXAMINER